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PURPLE LOOSESTRIFE and INVASIVE EUROPEAN COMMON REED: Threats to South Dakota's Wetlands and Waterways



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South Dakota has a large area made up of waterways and wetlands. According to the South Dakota Department of Environment and Natural Resources, there are 9,289 miles of perennial rivers and streams; 85,584 miles of intermittent streams; 204,987 acres of lakes, reservoirs, and ponds; and 1,780,859 acres of wetlands.

These areas are important to South Dakota's agriculture, wildlife, and recreation, and to the natural water movement within the state.

Invasive plant species infesting these areas can have a negative effect upon the natural ecosystems of an area. South Dakota has two aquatic weed pests of concern that are on the state and local noxious weed list; these weeds are purple loosestrife (*Lythrum salicaria*) and common reed or phragmites (*Phragmites australis*). Both of these troublesome weeds can change native ecosystems as well as water flow, thus increasing the chance of damage from flooding.

PURPLE LOOSESTRIFE

Purple loosestrife is an invasive perennial plant that affects aquatic sites. It is native to Eurasia and was accidentally brought to North America in the early 1800s as seeds in the ballast water of ships. It has also been introduced and planted throughout North America as an ornamental flower. These plants were sold in South Dakota as "male sterile" (will not produce pollen); however, they were able to cross-pollinate with some of the wild-type and produce viable seed. Purple loosestrife can no longer be sold as ornamental in the state and was placed on the state noxious weed list in 1997 by the South Dakota Weed and Pest Control Commission.

Impact

As purple loosestrife invades a wetland, it becomes the dominant species, negatively affecting the natural habitat by forcing original wetland species such

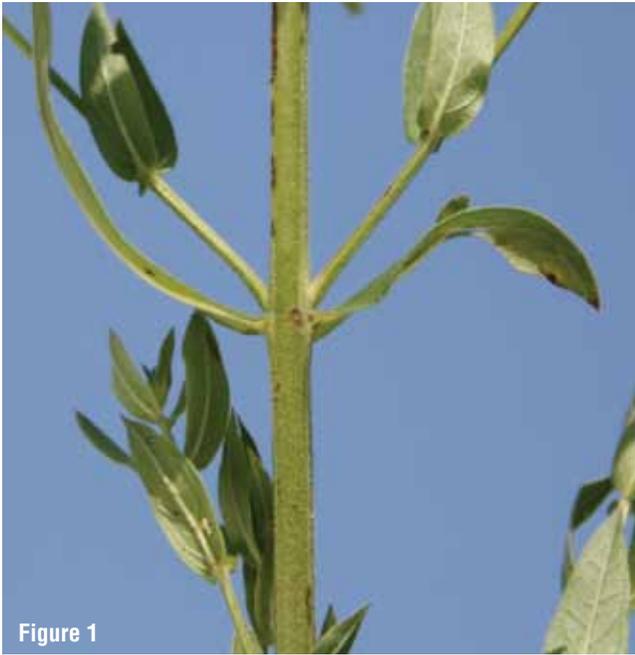


Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

as cattails, sedges, and rushes to decrease. Songbirds will not feed on loosestrife seed, muskrats cannot use loosestrife roots for food or shelter, and waterfowl lose nesting sites from dense loosestrife stands. Generally, local wildlife populations, including fish and amphibians, move to other habitats. This will directly affect recreational areas, limiting both tourism and sporting revenue.

Purple loosestrife that is vigorously growing in irrigation canals, ditches, stream banks, rivers, and reservoirs can clog the waterways, displacing currents and causing floods.

Identification

Purple loosestrife is an erect perennial herb with a square, woody stem and opposite or whorled leaves (fig. 1). The plant height will range in height from 1.5–8 feet. The stems can be smooth or pubescent with few branches. Leaves are thin and sharply pointed with smooth edges. Each stem can have up to five 1- to 3-foot-long spikes, which have the flowers arranged. Flowers have 5–7 petals and are magenta to purple in color. Flowers will emerge in June through September in South Dakota. The fruit is a small oblong capsule with 2 valves that contain 40–100 seeds each (fig. 2). The plant generally will have 50–150 capsules per spike, depending on the length of the spike. Several thousand tiny brownish-colored seeds are produced per plant (fig. 3). Mature plant rootstocks are quite extensive and can send out up to 30–50 shoots from buds at the top of the root crown.

Other purple-flowered plants sometimes confused with purple loosestrife commonly include dame's rocket (*Hesperis matronalis*) (fig. 4), hoary vervain (*Verbena stricta*) (fig. 5), and blue vervain (*Verbena hastata*) (fig. 6). Dame's rocket and the vervains have leaves that have toothed edges, and dame's rocket has a flower cluster rather than a flowering spike.

Control

Purple loosestrife has no native natural enemies to keep it in check and it outcompetes other plants. This makes it very difficult to stop from spreading once established. A good management plan to control purple loosestrife includes an integrated approach utilizing cultural, mechanical, biological, and chemical methods.

Cultural Control. Cultural controls include water manipulation, burning, and plant-replacement methods. Most of these cultural-control methods do not do an adequate job of controlling purple loosestrife and will need to have other control methods integrated to be effective.

Mechanical Control. Hand pulling and digging requires that the entire plant and roots be removed. Keep in mind that, if the roots break, new shoots can sprout and regrow. Mowing needs to be repeated several times throughout the growing season, as mowing does not remove any roots. Mowing does keep the plant from producing seed, as does cutting the flower spikes prior to the blooming period. Be sure to burn all cut plant parts to prevent accidental spread of the plant. Repeated disking of new purple loosestrife regrowth will deplete the rootstock of nutrients and energy required for the plant to regrow and survive. This method will require repeated disking for 3–4 years, and older stands may require an even longer time.

Chemical Control. Several broadleaf herbicides are effective on purple loosestrife. However, due to wetland-site restrictions, only those that have aquatic-use labeling can be considered. Refer to South Dakota Cooperative Extension Service publication FS525N, “Noxious Weed Control,” for updated label options in South Dakota for purple loosestrife.

The best time to apply an herbicide treatment to purple loosestrife is at the beginning of the flowering stage, which will occur in late June and July in South Dakota. Generally it will take 1–2 years of an herbicide program to reduce purple loosestrife stands and increase native populations of cattails and other aquatic grasses. Always be sure to read and follow herbicide label directions and restrictions.

Biological Control. There are three insect biological control agents approved for use in North America. Of the three, two, a leaf-defoliating beetle (*Galerucella spec.*) and the loosestrife root weevil (*Hylobius transversovittatus*), have been released in South Dakota. The flower-feeding weevil (*Nanaphyes marmoratus*) has not been actively used in the state.

The adult loosestrife root weevil (fig. 7) feeds on the plant foliage and young stems, usually at night, as the weevil is nocturnal. It is the larval form (fig.8) that has the most effect on the plant, feeding on the root hairs after hatching, and then moving into the roots, mining into the center of the crown (fig. 9). Damaged plants are weakened because of the root and crown damage, hampering the plant's ability to build carbohydrate reserves.

The primary insect used to control purple loosestrife in South Dakota is the defoliating beetle (*Galerucella calmar-iensis* and *Galerucella pusilla*) (fig. 10). Both the adult and the larva feed on leaves and young plant-shoot tips (fig. 11). Adult feeding or “shot-hole feeding” can cause significant injury to a plant (fig. 12). Larval feeding is characterized by a skeletal effect (fig. 13).

South Dakota and Nebraska have a cooperative effort to rear *Galerucella sp.* insects for release. Loosestrife roots and crowns are dug (fig. 14) and transplanted into buckets



Figure 7



Figure 8



Figure 10



Figure 11



Figure 13



Figure 9



Figure 12

and placed in a simulated wetland environment (fig. 15). When the plants reach a height of 12–18 inches, the buckets are covered with a fine-mesh netting tent (figs. 16, 17) and the *Galerucella* beetles are introduced. The tents both prevent the *Galerucella* beetles from escaping and protect them from predators. Plants are allowed to mature and the insects complete their life cycle. At this point, the buckets are available to counties to place into purple loosestrife infestations and introduce the insects to that site.

Biological control of purple loosestrife is especially valuable for sites that are not easily accessible for other control methods. Biocontrol also works well as an integrated approach, especially when used with herbicides and when working around the insect's life cycle.



Figure 14

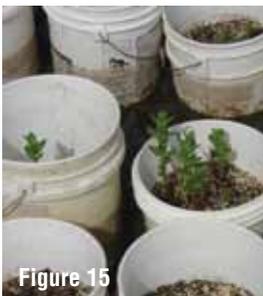


Figure 15



Figure 16



Figure 17

EUROPEAN COMMON REED OR PHRAGMITES

Phragmites or common reed (*Phragmites australis*) is a perennial wetland grass that is threatening the ecological health of South Dakota's wetlands.

There are two biotypes of Phragmites that grow in South Dakota, a native common reed (*Phragmites australis* subsp. *americanus*) and a non-native European biotype (*Phragmites australis* subs. *australis*). The European biotype is considered highly invasive in North America. Populations of the native common reed pose very little if any threat to other native species. The invasive-type European common reed was added to South Dakota's local noxious list in 2008 by the South Dakota Weed and Pest Control Commission.

Impact

When European common reed invades a site, it can quickly change the wetland hydrology, alter the wildlife habitat, and increase the chance of fire danger. The high biomass (fig. 18) of this invasive plant blocks light from other plants and will occupy most of the growing space above- and belowground, thus creating its own monoculture.

As an infestation thickens, the root mats that develop trap sediments, changing the water movement and increasing the soil surface (which can dry out a marsh). These changes can reduce the water available for irrigation and can reduce areas important as nursery areas for fish and other small creatures.

Increased amounts of European common reed will reduce the diversity of plant species, preventing the growth of cattails and of desirable native grass species. It will also create an unsuitable habitat for bird species such as migrating waders and waterfowl species. The dense jungle of vegetation is difficult for many wildlife species to penetrate, and as it matures and dries out, it creates a fire hazard.

Economically, European common reed can create a loss of recreational land, affecting fishing, hunting, boating, and other recreational activities.



Figure 18

Identification

The native phragmites strains have been a part of the North America plant heritage for thousands of years and should be protected. Therefore, being able to identify the two biotypes is an important part of a common reed (phragmites) management program. The invasive European common reed is a perennial grass that has a vigorous root system, which includes rhizomes and stolons. Annual lateral spread of the rhizomes can range from 1–10 feet, and stolons can grow up to 80-feet long. Roots grow 3–9 feet deep, which makes them very difficult to fully remove. The plant can produce up to 200 stems per square yard and can be 12-feet tall. Native and non-native common reed is almost identical; therefore, it can be difficult to tell the two subspecies apart. The following physical characteristics can be used to separate and identify the native and non-native plants:

Native Common Reed:

1. Most leaf sheaths are not adhered to the culms and, if present, are loosely attached.
2. A reddish-colored stem is visible when the leaf sheath is removed. The stem texture is smooth and shiny.
3. The plant color is a lighter yellow-green than the non-native type (fig. 19).
4. Small, round, black spots (fungal disease) are visible on the stem if the leaf and leaf sheaths are stripped from the plant (fig. 20).
5. The seedhead is usually more sparse compared to the dense seedhead of the non-native type; however, this does not automatically indicate it is the native type (fig. 21).



6. The rhizome density is lower in the native type, and rhizomes tend to be more yellow in color. The non-native type is white to light yellow and will darken after it is dug up and exposed to air.
7. Stem density is low.

European Common Reed:

1. Most leaf sheaths are present on the culms.
2. A green stem with yellowish nodes is common. The stem texture is rough, dull, and rigid. Stems are ribbed, and ridges are visible with the naked eye.
3. Plant color is a darker blue-green.
4. The non-native type is not susceptible to the fungus disease that causes the spots in the native type, so spots on the stem are absent.
5. Stem density is high and the overall plant is more robust.

Late winter or early spring is a good time to compare plants, as the contact with seasonal snow, ice, and wind tends to break down the native-type common reed, but the non-native type tends to stay more upright and intact.

Control

An integrated approach to the management of the European common reed is recommended, as control can be a challenge. Control methods can include a combination of cultural, mechanical, biological, and chemical options.

Cultural Control

Controlled burn. Fire used alone is not effective in controlling common reed, as the original stand will be replaced with a more vigorous growth. However, burning late in the season can reduce stand vigor and seed production. Prescribed burning must be handled carefully and should only be conducted by properly trained individuals. In addition, burning in the early spring could actually stimulate the growth of the common reed plants.

Flooding. Common reed colonies will not expand if the water depth is maintained to a depth of at least 5 feet. However, flooding will alter existing or established stands. Runners will not anchor at this water depth and will float to the surface. Seedlings are easily killed by rising water levels. The timing of water-level manipulations needs to be planned carefully not only to be effective but also to avoid any conflicts with other management objectives.

Grazing. An intensive grazing program over a long period of time can reduce the size and biomass of a common reed stand. However, the rhizomes are not controlled and may actually increase primary and secondary shoot growth once grazing is stopped. Grazing must be done early to avoid palatability issues for the livestock.

Mechanical Control. Mechanical control options are possible during dry periods in periodically flooded wetlands. It is unlikely that this method alone will kill the common reed, but the method will slow the spread of established stands.

Disking. Disking can chop through the rhizomes opening dense stands and reduce above ground biomass. Repeated disking can control common reed stands. Disking in summer or fall reduces stem densities, while disking from late winter to mid-summer stimulates bud production, increasing stand densities. Disking is more effective than plowing, as disking creates smaller rhizomes that are less aggressive because of lower-root reserves. The most effective time to cut rhizomes is late in the growing season, around September through October.

Mowing. Wetland areas that are dry during the summer can be mowed repeatedly through the season. The most effective time to mow is August and September. This method could be used as a set-up to an herbicide treatment the next year.

Digging. This method is more practical for small colonies growing in loose or sandy soils. It is very labor intensive and expensive for larger infestations, and removal of the entire rhizome is difficult. With digging, there is also a change of reinfestation because it disturbs the soil, providing excellent conditions for new common reed growth.

Biological Control. There are several insects being studied as possible biological control agents for European common reed. There are only a few insects that feed strictly on the non-native type of common reed; these include a rhizome-feeding moth (*Rhizedra lutosa*), a gall midge (*Lasiptera hungarica*), and an aphid (*Hyalopterus pruni*).

Chemical Control. The non-native common reed is most effectively managed by combining control options as an integrated approach with herbicides. Herbicide treatments can be made in the spring when plants are 2- to 3-feet tall, during the period of active green growth. Another good time is in late summer to early fall after the plant has flowered. Generally it will take repeated treatments for several years to prevent surviving rhizomes from re-sprouting.

For a list of labeled herbicide options for European common reed control in South Dakota, refer to South Dakota Cooperative Extension Service publication FS525N, "Noxious Weed Control." Treatments listed are labeled for aquatic use, so be sure to read and follow all label instructions and restrictions.

SUMMARY

Purple loosestrife and invasive European common reed are serious perennial weeds that are found in wetlands across South Dakota. Both of these weed pests are quite invasive and will have a negative effect on the ecosystems and related economic benefits of these wetlands.

Purple loosestrife is included on the South Dakota state noxious weed list, and European common reed is included on the South Dakota locally noxious weed list.

Due to the competitive and invasive characteristics of these plants, it is important to be able to identify and develop management plans to control these weed pests.

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